^{253}No α decay:1.62 min 2006Lo12,2004He28

History

Type	Author	Citation	Literature Cutoff Date
Full Evaluation	Khalifeh Abusaleem	NDS 112, 2129 (2011)	31-Dec-2010

Parent: ^{253}No: E=0.0; $J^{\pi}=9/2^{-}$; $T_{1/2}$=1.62 min *15*; Q(α)=8411 *5*; %α decay=8×10[1] *2*

^{253}No-$T_{1/2}$: Weighted average of 95 s *10* (1967Mi03) and 105 s *20* (1967Gh01,1971GhZV) ^{242}Pu(^{16}O,5n) and ^{246}Cm(^{12}C,5n), resp.

^{253}No-Configuration=9/2[734].

^{253}No-Q(α): from Eα=8004 *5* and E(level)=279.7 (2004He28). 2011AuZZ list 8414 *4*, 2009AuZZ and 2003Au03 list 8421 *8*.

2006Lo12 and 2006Po10: ^{253}No produced in ^{207}Pb(^{48}Ca,2n). Residues separated by VASSILISSA recoil separator and implanted into GABRIELA detection system at FLNR, JINR. The source was mixed with ^{254}No which made it impossible to determine the absolute α decay branching ratios. Measured α, γ, $\gamma\gamma$ coin, $\alpha\gamma$ coin, conversion electrons and α(ce) coin. Prompt and delayed spectra following α decay of ^{253}No.

2004He28 and 2004He04: ^{253}No produced in ^{207}Pb(^{48}Ca,2n) (92.4% enriched target). Residues separated by SHIP velocity filter and implanted into PIPS of GSI. Measured α, γ, $\gamma\gamma$ coin, $\alpha\gamma$ coin. Prompt and delayed spectra following α decay of ^{253}No.

1997He29: from parent α (^{257}Rf) – daughter α (^{253}No) correlations there may be some indication that the ^{253}No α decay involves the decay of two isomers. Possibly the 8063 α are correlated with the α's from 3.9 s ^{257}Rf. However, on the basis of the current data a final conclusion is not possible (1997He29).

2007Lo11: same group of 2006Lo12.

2011Lo06: confirmed the work of 200Lo12 and observed a new α-group to a ($7/2^{-}$) state at 669 keV.

Others: 2009Qi04, 2010Ye06.

Theoretical work: 2006Sh19.

The data are from 2006Lo12, unless otherwise stated.

^{249}Fm Levels

E(level)	J^{π}	Comments
0‡	$7/2^{+}$	Configuration=7/2[624].
58.0‡ *3*	$9/2^{+}$	
128.6‡ *4*	$11/2^{+}$	
146†		May consist of an unresolved doublet.
209.5 *5*	$5/2^{+}$	Configuration=5/2[622].
254 *17*		E(level): calculated by the evaluator from Eα in 1997He29.
279.80 *19*	$9/2^{-}$	Configuration=9/2[734].
669 *3*	($7/2^{-}$)	From 2011Lo06. Configuration=7/2[743].

† Observed in 1997He29 with the comment of being doublet.

‡ Band(A): 7/2[624].

α radiations

Eα	E(level)	Iα#	HF‡	Comments
7615 *30*	669			
8003 *5*	279.80	72 *18*	1.6 *6*	Eα: 8004 *5* (2004He28); 8011 *21* (1997He29), 8007 *4* (2011Lo06). Iα,HF: assuming 90% α decay branch to this level and α decay branch=80% *20* for ^{253}No decay (2006Lo12).
8038 *17*	254	31 *3*	4.5 *14*	Eα: from 1997He29.
8070 *10*	209.5	3.5 *14*	57 *28*	Iα,HF: Iα(211 level)/Iα(280 level)=0.049 *15* (2006Lo12). Eα: 8063 *21* (1997He29), 8080 *10* (2011Lo06).
8144†	146	8 *2*	41 *15*	May consist of an unresolved doublet.

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^{253}No α decay:1.62 min 2006Lo12,2004He28 (continued)

α radiations (continued)

Eα	E(level)	Comments
8150 *20*	128.6	Eα: 8144 (1997He29).
8220 *20*	58.0	
8280 *20*	0	

† Observed in 1997He29 with the comment of being doublet.
‡ $r_0(^{249}Fm)$=1.48 *2*.
# For absolute intensity per 100 decays, multiply by 0.8 *2*.

$\gamma(^{249}Fm)$

The numerical values of conversion coefficients listed here are read from figure 6 of 2006Lo12.
The electron spectrum of 2006Lo12 shows peaks at 55, 65, 80, 100, 135, 200 and 250.

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	α‡	Comments
58.0	$9/2^+$	58		0	$7/2^+$			
128.6	$11/2^+$	71		58.0	$9/2^+$			
		129		0	$7/2^+$	E2	8.25 *12*	α(L)=5.92 *9*; α(M)=1.702 *24*; α(N+..)=0.626 *9* α(N)=0.484 *7*; α(O)=0.1224 *18*; α(P)=0.0197 *3*; α(Q)=9.29×10^{-5} *13* Mult.: α(L+...)expα(M+...)expα(N+...)exp=4.0 *18* (2006Lo12).
209.5	$5/2^+$	209.5 *5*	30 *12*	0	$7/2^+$	M1	5.60 *9*	α(K)=4.33 *7*; α(L)=0.943 *15*; α(M)=0.233 *4*; α(N+..)=0.0857 *14* α(N)=0.0650 *11*; α(O)=0.0172 *3*; α(P)=0.00333 *6*; α(Q)=0.000186 *3* E_γ: From 2011Lo06. RI(209.5/279.9)=0.3 *1* (2011Lo06). E_γ: From 2011Lo06. Mult.: From the experimental internal conversion. Mult.: α(L+...)expα(M+...)expα(N+...)exp=2.8 *22* (2006Lo12).
279.80	$9/2^-$	151.23† *31*	18† *1*	128.6	$11/2^+$	E1	0.213 *4*	α(K)=0.1581 *24*; α(L)=0.0412 *7*; α(M)=0.01024 *16*; α(N+..)=0.00369 *6* α(N)=0.00284 *5*; α(O)=0.000726 *11*; α(P)=0.0001254 *19*; α(Q)=4.50×10^{-6} *7* E_γ: Weighted average of 151.2 *4* (2011Lo01) and 151.4 *5* (2006Lo12). RI(151/279.9)=0.45 *2* (2011Lo06). 151γ in coin with ≈55−keV and ≈70−keV electrons. Mult.: α(L+...)expα(M+...)expα(N+...)exp=0.11 *3* (2006Lo12). α(K)exp<0.98, α(L)exp<0.3 (2004He28).
		221.83† *19*	100†	58.0	$9/2^+$	E1	0.0915	α(K)=0.0697 *10*; α(L)=0.01629 *23*; α(M)=0.00403 *6*; α(N+..)=0.001459 *21* α(N)=0.001117 *16*; α(O)=0.000288 *4*; α(P)=5.13×10^{-5} *8*; α(Q)=2.05×10^{-6} *3* E_γ: Weighted average of 221.8 *2* (2011Lo01) and

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^{253}No α decay:1.62 min 2006Lo12,2004He28 (continued)

$\gamma(^{249}Fm)$ (continued)

E_i(level)	J_i^π	E_γ	I_γ	E_f	J_f^π	Mult.	α‡	Comments
								222.0 *5* (2006Lo12). RI(221.8/279.9)=2.06 *7* (2011Lo06). 222γ in coin with ≈70−keV electrons and with α particles. Mult.: α(L+...)expα(M+...)expα(N+...)exp=0.04 *1* (2006Lo12). α(K)exp<0.17, α(L)exp<0.05 (2004He28). No $\gamma\gamma$ coincidences observed between 151γ, 222γ and 280γ (2006Lo12,2004He28).
279.80	9/2$^-$	279.79† *19*	48† *2*	0	7/2$^+$	E1	0.0555 *8*	α(K)=0.0428 *6*; α(L)=0.00952 *14*; α(M)=0.00235 *4*; α(N+..)=0.000851 *12* α(N)=0.000651 *10*; α(O)=0.0001686 *24*; α(P)=3.05×10^{-5} *5*; α(Q)=1.293×10^{-6} *19* E_γ: From 2011Lo06. I_γ: =1.00 *4* (2011Lo06). 280γ in coin with α particles. Mult.: α(L+...)expα(M+...)expα(N+...)exp=0.08 *2*, α(K)exp=0.12 *3* (2006Lo12). α(K)exp<0.35, α(L)exp<0.1 (2004He28), α(K)exp=0.145 *22*, α(LMN+)=0.076 *12* (2011Lo06).
669	(7/2$^-$)	669 *3*	0.4 *2*	0	7/2$^+$			

† From 2004He28. The γ ray also reported by 2006Lo12.

‡ Total theoretical internal conversion coefficients, calculated using the BrIcc code (2008Ki07) with Frozen orbital approximation based on γ-ray energies, assigned multipolarities, and mixing ratios, unless otherwise specified.

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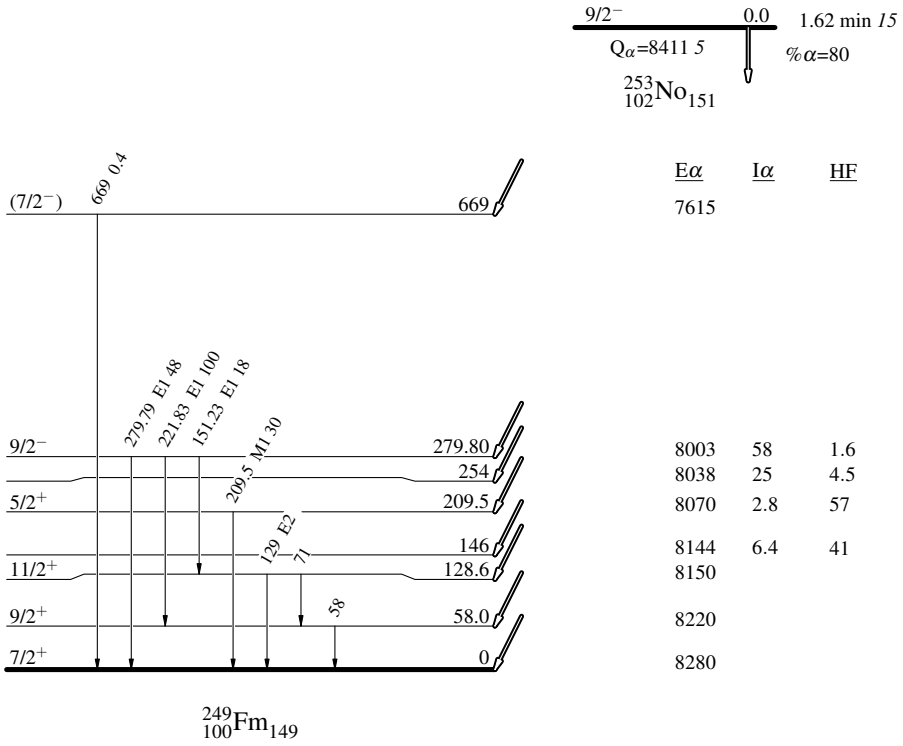
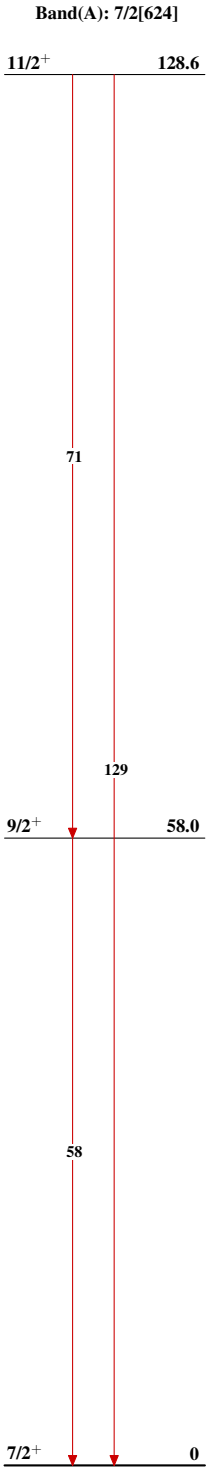
Decay Scheme

Intensities: Relative photon branching from each level



Eα	Iα	HF
7615		
8003	58	1.6
8038	25	4.5
8070	2.8	57
8144	6.4	41
8150		
8220		
8280		

^{253}No α decay:1.62 min 2006Lo12,2004He28



$^{249}_{100}Fm_{149}$